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| 10/528,070 | 03/17/2005 | Akio Aoyama | Y1929.0106 | 6377 |

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| EXAMINER | |
|---|---|
| LOFTIN, CELESTE | |
| **ART UNIT** | **PAPER NUMBER** |
| 2686 | |

DATE MAILED: 12/28/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/528,070 | AOYAMA ET AL. | |
| | Examiner | Art Unit | |
| | Celeste L. Loftin | 2686 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *04 August 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-14* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-14* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *15 March 2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *03/17/2005*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

## DETAILED ACTION

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 6-7 are rejected under 35 U.S.C. 102(b) as being anticipated by Kronestedt, **U.S. Patent 6,104,936**.

Regarding claim 6, Kronestedt discloses an apparatus for deciding tilt angles of antennas having directivity in a vertical plane, which are provided in a plurality of radio base stations constituting a radio communication system, said apparatus comprising:

first antenna selecting means for selecting an antenna whose tilt angle is to be reduced (a traffic load in the target cell and the neighbor cell can be monitored and used to indirectly measure target cell coverage area reduction (in order to determine the optimum base station antenna tilt angle, it is imperative to consider target cell reduction) and to adjust this situation accordingly the antenna beam could be pulled inward or outward (decreasing tilt angle)) **(col. 5 lines 6-15, 62-67 and col. 6 lines 1-10)**;

second antenna selecting means for selecting an antenna whose tilt angle is to be reduced (a traffic load in the target cell and the neighbor cell can be monitored and used to indirectly measure target cell coverage area reduction (in order to determine the optimum base station antenna tilt angle, it is imperative to consider target cell reduction) and to adjust this situation accordingly the antenna beam could be pulled inward or outward (decreasing tilt angle)) **(col. 5 lines 6-15, 62-67 and col. 6 lines 1-10)**;

deterioration rate calculating means for calculating a deterioration rate of the entire system after a tilt angle of the antenna selected by the first antenna selecting means or the second antenna selecting means is changed, said deterioration rate being calculated at least once after a tilt angle is changed (measurements (for each candidate antenna tilt angle) are periodically received by the MSC/BSC from the base station and at the end of every period the measurements (meaning the increase was done at the end of the period and if the measurements are periodic the increase must be used to calculate the new interference measurement) are filtered each measurement is has a 90 percent cumulative probability for each angle and a relatively large overall interference for a given tilt angle may indicate a need to increase the antenna tilt angle) **(col. 4 lines 48-52 and 55-67 and col. 5 lines 1-5)**;

data storage means for storing the deterioration rate calculated by the deterioration rate calculating means and tilt angles associated therewith (the invention includes a interference measurement filter, which is implemented by software and it is stored and executed by the MSC/BSC (inorder for the interference information is stored then it must be outputted to MSC)) **(col. 4 lines 35-44)**.; and

means for outputting tilt angles realizing the smallest deterioration rate of the entire system from data of the tilt angles and deterioration rates stored in the data storage means (the invention includes a interference measurement filter, which is implemented by software and it is stored and executed by the MSC/BSC (inorder for the interference information is stored then it must be outputted to MSC)) **(col. 4 lines 35-44)**.

Regarding claim 7, Kronestedt discloses an apparatus for deciding tilt angles of antennas of a radio communication system according to claim 6, wherein one of or both of the first antenna selecting means and the second antenna selecting means select antennas based on deterioration rates of coverage of the antennas (measurements (for each candidate antenna tilt angle) are periodically received by the MSC/BSC from the base station and at the end of every period the measurements (meaning the increase was done at the end of the period and if the measurements are period the increase must be used to calculate the new interference measurement) are filtered each measurement is has a 90 percent cumulative probability for each angle (each candidate antenna tilt angle) and a relatively large overall interference for a given tilt angle may indicate a need to increase the antenna tilt angle) **(col. 4 lines 48-52 and 55-67 and col. 5 lines 1-5)**.

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1-5 and 8-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kronestedt, **U.S. Patent 6,104,936,** in view of Johannisson et al. (Johannisson), **U.S. Patent 6,282,434**.

Regarding claim 1, Kronestedt discloses a method for deciding tilt angles of antennas having directivity in a vertical plane, which are provided in a plurality of radio base stations constituting a radio communication system, said method comprising:

a first step of selecting an antenna whose tilt angle is to be reduced (a traffic load in the target cell and the neighbor cell can be monitored and used to indirectly measure target cell coverage area reduction (in order to determine the optimum base station antenna tilt angle, it is imperative to consider target cell reduction) and to adjust this situation accordingly the antenna beam could be pulled inward or outward (decreasing tilt angle)) **(col. 5 lines 6-15, 62-67 and col. 6 lines 1-10)**;

a second step of calculating a deterioration rate of the entire system more than once based on a tilt angle of the antenna selected in the first step (a traffic load in the target cell and the neighbor cell can be monitored and used to indirectly measure target cell coverage area reduction (in order to determine the optimum base station antenna tilt angle, it is imperative to consider target cell reduction) and to adjust this situation accordingly the antenna beam could be pulled inward or outward (decreasing tilt angle)) **(col. 5 lines 6-15, 62-67 and col. 6 lines 1-10)**;

a third step of selecting an antenna whose tilt angle is to be increased (measurements (for each candidate antenna tilt angle) are periodically received by the MSC/BSC from the base station and at the end of every period the measurements are filtered each measurement is has a 90 percent cumulative probability for each angle and a relatively large overall interference for a given tilt angle may indicate a need to increase the antenna tilt angle) **(col. 4 lines 48-52 and 55-67 and col. 5 lines 1-5)**;

a fourth step of calculating a deterioration rate (i.e. interference measurement) of the entire system more than once (i.e. periodically) , by changing the tilt angle, at the time when a tilt angle of the antenna selected in the third step is increased (measurements (for each candidate antenna tilt angle) are periodically received by the MSC/BSC from the base station and at the end of every period the measurements (meaning the increase was done at the end of the period and if the measurements are period the increase must be used to calculate the new interference measurement) are filtered each measurement is has a 90 percent cumulative probability for each angle and a relatively large overall interference for a given tilt angle may indicate a need to increase the antenna tilt angle) **(col. 4 lines 48-52 and 55-67 and col. 5 lines 1-5)**; and

a fifth step of outputting the tilt angle corresponding to the smallest deterioration rate in the deterioration rate of the entire system calculated in the second step and the deterioration rate of the entire system calculated in the fourth step (the invention includes a interference measurement filter, which is implemented by software and it is stored and executed by the MSC/BSC (inorder for the interference information is stored then it must be outputted to MSC)) **(col. 4 lines 35-44)**.

Kronestedt fails to disclose changing the tilt angle, when a tilt angle of the antenna selected in the first step is reduced.

In a similar field of endeavor, Johannisson changing the tilt angle, when a tilt angle of the antenna selected in the first step is reduced (it is possible to achieve a substantial gain downlink C/I by antenna pattern down tilt without reducing the coverage

limiting uplink strength and site to site distance) **(col. 3 lines 50-55 and col.5 lines 9-15)**.

At the time of invention it would have been obvious to one of ordinary skill in the art to further modify Kronestedt to include changing the tilt angle, when a tilt angle of the antenna selected in the first step is reduced. Motivation for this modification would have been to determine the optimum base station antenna tilt angle.

Regarding claim 2, the combination discloses a method for deciding tilt angles of antennas of a radio communication system according to claim 1. Kronestedt further discloses further comprising:

a sixth step being performed after the first step and the second step, wherein it is determined whether processes of the first step and the second step are to be repeated (the measurements are done periodically (meaning that if the determining factor would have been the end of that period of measurements) a large overall interference measurement may suggest a need to increase tilt angle) **(col. 4 lines 45-52 and 65-67 and col. 5 lines 1-5)** ;

a seventh step being performed after the third step and the fourth step, wherein it is determined whether processes of the third step and the fourth step are to be repeated (the measurements are done periodically (meaning that if the determining factor would have been the end of that period of measurements) a large overall interference measurement may suggest a need to increase tilt angle) **(col. 4 lines 45-52 and 65-67 and col. 5 lines 1-5)**; and

an eighth step being performed after the first step to the seventh step, wherein it is determined whether processes of the first step to the seventh step are to be repeated (the measurements are done periodically (meaning that if the determining factor would have been the end of that period of measurements) a large overall interference measurement may suggest a need to increase tilt angle) **(col. 4 lines 45-52 and 65-67 and col. 5 lines 1-5)**.

Regarding claim 3, the combination discloses a method of deciding tilt angles of antennas of a radio communication system according to claim 2. Kronestedt further discloses further comprising;

a ninth step being performed right before the first step wherein a step angle being used for changing a tilt angle in the second step is changed in accordance with the accumulated number of times of repetitions of the processes (the MSC can repeats the technique until all the candidate antenna tilt angles have been tested and then a signal is sent to the base station to reposition the antenna) **(col. 8 lines 1-10)** if it is determined in the eighth step that the processes of the first step to the seventh step are to be repeated (the measurements are done periodically (meaning that if the determining factor would have been the end of that period of measurements) a large overall interference measurement may suggest a need to increase tilt angle) **(col. 4 lines 45-52 and 65-67 and col. 5 lines 1-5)**.

Regarding claim 4, the combination discloses a method of deciding tilt angles of antennas of a radio communication system according to claim 2. Kronestedt further discloses further comprising;

a tenth step being performed right before the third step wherein a step angle being used for changing a tilt angle in the fourth step is changed in accordance with the accumulated number of times of repetitions of the processes (the MSC can repeats the technique until all the candidate antenna tilt angles have been tested and then a signal is sent to the base station to reposition the antenna) **(col. 8 lines 1-10)** if it is determined in the eights step that the processes of the first step to the seventh step are to be repeated (meaning that if the determining factor would have been the end of that period of measurements) a large overall interference measurement may suggest a need to increase tilt angle) **(col. 4 lines 45-52 and 65-67 and col. 5 lines 1-5)**.

Regarding claim 5, the combination discloses a method of deciding tilt angles of antennas of a radio communication system according to claim 1. Kronestedt discloses

wherein one of or both of the first step of selecting an antenna for reducing the tilt angle and the third step of selecting an antenna for increasing the tilt angle selects or select antennas based on deterioration rates of coverage of the antennas, respectively (measurements (for each candidate antenna tilt angle) are periodically received by the MSC/BSC from the base station and at the end of every period the measurements (meaning the increase was done at the end of the period and if the measurements are period the increase must be used to calculate the new interference measurement) are filtered each measurement is has a 90 percent cumulative probability for each angle (each candidate antenna tilt angle) and a relatively large overall interference for a given tilt angle may indicate a need to increase the antenna tilt angle) **(col. 4 lines 48-52 and 55-67 and col. 5 lines 1-5)**.

Regarding claim 8, Kronestedt discloses an apparatus for deciding tilt angles of antennas of a radio communication system according to claim 6, further comprising:

process switching means (i.e. MSC/BSC) for outputting information on switching among an operation by the first antenna selecting means, an operation by the second antenna selecting means, and termination of processes (the invention includes a interference measurement filter, which is implemented by software and it is stored and executed by the MSC/BSC (inorder for the interference information is stored then it must be outputted to MSC)) **(col. 4 lines 35-44)**;

a switching frequency counter for counting the information on switching outputted from the process switching means (the MSC can repeats the technique until all the candidate antenna tilt angles have been tested and then a signal is sent to the base station to reposition the antenna) **(col. 8 lines 1-10)**.

Kronestedt fails to discloses a means for setting tilt angle change parameters which changes a degree of tilt angle change for an antenna selected by the first antenna selecting means or the second antenna selecting means once frequency of switching counted by the switching frequency counter is a predetermined number or larger.

In a similar field of endeavor, Johannisson discloses a means for setting tilt angle change parameters which changes a degree of tilt angle change for an antenna selected by the first antenna selecting means or the second antenna selecting means once frequency of switching counted by the switching frequency counter is a predetermined number or larger (in all instances where duplex filters and amplifiers are

included in the antenna, the number of radiating elements connected to each duplex filter may vary (this invention makes it possible to achieve a substantial gain downlink C/I by antenna pattern down tilt)) **(col. 5 lines 5-15)**.

At the time of invention it would have been obvious to one of ordinary skill in the art to further modify Kronestedt to include a means for setting tilt angle change parameters which changes a degree of tilt angle change for an antenna selected by the first antenna selecting means or the second antenna selecting means once frequency of switching counted by the switching frequency counter is a predetermined number or larger. Motivation for this modification would have been to determine the optimum base station antenna tilt angle.

Regarding claim 9, the combination discloses a method of deciding tilt angles of antennas of a radio communication system according to claim 3. Kronestedt further discloses further comprising;

a tenth step being performed right before the third step wherein a step angle being used for changing a tilt angle in the fourth step is changed in accordance with the accumulated number of times of repetitions of the processes (the MSC can repeats the technique until all the candidate antenna tilt angles have been tested and then a signal is sent to the base station to reposition the antenna) **(col. 8 lines 1-10)** if it is determined in the eights step that the processes of the first step to the seventh step are to be repeated (meaning that if the determining factor would have been the end of that period of measurements) a large overall interference measurement may suggest a need to increase tilt angle) **(col. 4 lines 45-52 and 65-67 and col. 5 lines 1-5)**.

Regarding claim 10, the combination a method of deciding tilt angles of antennas of a radio communication system according to claim 2. Kronestedt discloses wherein one of or both of the first step of selecting an antenna for reducing the tilt angle and the third step of selecting an antenna for increasing the tilt angle selects or select antennas based on deterioration rates of coverage of the antennas, respectively (measurements (for each candidate antenna tilt angle) are periodically received by the MSC/BSC from the base station and at the end of every period the measurements (meaning the increase was done at the end of the period and if the measurements are period the increase must be used to calculate the new interference measurement) are filtered each measurement is has a 90 percent cumulative probability for each angle (each candidate antenna tilt angle) and a relatively large overall interference for a given tilt angle may indicate a need to increase the antenna tilt angle) **(col. 4 lines 48-52 and 55-67 and col. 5 lines 1-5)**.

Regarding claim 11, the combination a method of deciding tilt angles of antennas of a radio communication system according to claim 3. Kronestedt discloses wherein one of or both of the first step of selecting an antenna for reducing the tilt angle and the third step of selecting an antenna for increasing the tilt angle selects or select antennas based on deterioration rates of coverage of the antennas, respectively (measurements (for each candidate antenna tilt angle) are periodically received by the MSC/BSC from the base station and at the end of every period the measurements (meaning the increase was done at the end of the period and if the measurements are period the increase must be used to calculate the new interference measurement) are filtered each

measurement is has a 90 percent cumulative probability for each angle (each candidate antenna tilt angle) and a relatively large overall interference for a given tilt angle may indicate a need to increase the antenna tilt angle) **(col. 4 lines 48-52 and 55-67 and col. 5 lines 1-5)**.

Regarding claim 12, the combination a method of deciding tilt angles of antennas of a radio communication system according to claim 4. Kronestedt discloses wherein one of or both of the first step of selecting an antenna for reducing the tilt angle and the third step of selecting an antenna for increasing the tilt angle selects or select antennas based on deterioration rates of coverage of the antennas, respectively (measurements (for each candidate antenna tilt angle) are periodically received by the MSC/BSC from the base station and at the end of every period the measurements (meaning the increase was done at the end of the period and if the measurements are period the increase must be used to calculate the new interference measurement) are filtered each measurement is has a 90 percent cumulative probability for each angle (each candidate antenna tilt angle) and a relatively large overall interference for a given tilt angle may indicate a need to increase the antenna tilt angle) **(col. 4 lines 48-52 and 55-67 and col. 5 lines 1-5)**.

Regarding claim 13, the combination a method of deciding tilt angles of antennas of a radio communication system according to claim 9. Kronestedt discloses wherein one of or both of the first step of selecting an antenna for reducing the tilt angle and the third step of selecting an antenna for increasing the tilt angle selects or select antennas based on deterioration rates of coverage of the antennas, respectively (measurements

(for each candidate antenna tilt angle) are periodically received by the MSC/BSC from the base station and at the end of every period the measurements (meaning the increase was done at the end of the period and if the measurements are period the increase must be used to calculate the new interference measurement) are filtered each measurement is has a 90 percent cumulative probability for each angle (each candidate antenna tilt angle) and a relatively large overall interference for a given tilt angle may indicate a need to increase the antenna tilt angle) **(col. 4 lines 48-52 and 55-67 and col. 5 lines 1-5)**.

Regarding claim 14, the combination discloses an apparatus for deciding tilt angles of antennas of a radio communication system according to claim 7, further comprising:

process switching means for outputting information on switching among an operation by the first antenna selecting means, an operation by the second antenna selecting means, and termination of processes (the invention includes a interference measurement filter, which is implemented by software and it is stored and executed by the MSC/BSC (inorder for the interference information is stored then it must be outputted to MSC)) **(col. 4 lines 35-44)**;

a switching frequency counter for counting the information on switching outputted from the process switching means (the MSC can repeats the technique until all the candidate antenna tilt angles have been tested and then a signal is sent to the base station to reposition the antenna) **(col. 8 lines 1-10)**.

Kronestedt fails to discloses a means for setting tilt angle change parameters which changes a degree of tilt angle change for an antenna selected by the first antenna selecting means or the second antenna selecting means once frequency of switching counted by the switching frequency counter is a predetermined number or larger.

In a similar field of endeavor, Johannisson discloses a means for setting tilt angle change parameters which changes a degree of tilt angle change for an antenna selected by the first antenna selecting means or the second antenna selecting means once frequency of switching counted by the switching frequency counter is a predetermined number or larger (in all instances where duplex filters and amplifiers are included in the antenna, the number of radiating elements connected to each duplex filter may vary (this invention makes it possible to achieve a substantial gain downlink C/I by antenna pattern down tilt)) **(col. 5 lines 5-15)**.

At the time of invention it would have been obvious to one of ordinary skill in the art to further modify Kronestedt to include a means for setting tilt angle change parameters which changes a degree of tilt angle change for an antenna selected by the first antenna selecting means or the second antenna selecting means once frequency of switching counted by the switching frequency counter is a predetermined number or larger. Motivation for this modification would have been to determine the optimum base station antenna tilt angle.

***Conclusion***

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Celeste L. Loftin whose telephone number is 571-272-2842. The examiner can normally be reached on Monday thru Friday 8am-5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Marsha Banks-Harold can be reached on 571-272-7905. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

CL

JOHN K. CONTEE
PATENT EXAMINER